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Address to the Section of Preventive Medicine

BY

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President.

The subjects which we have met to discuss here are Preventive Medicine and Vital Statistics. When I was a student little or nothing was heard of those subjects, and one might be inclined to think that they are new. But here, as in many other departments of human activity, the words of the Preacher are true[1]: "The thing that hath been, it is that which shall be; and that which is done is that which shall be done: and there is no new thing under the sun. Is there anything whereof it may be said, See, this is new? it hath been already of old time, which was before us."

The first mention that I know of vital statistics was about 1,000 years B.C., when David, King of Israel, numbered the people, and this afforded a basis for estimating the death-rate occasioned by the pestilence which raged immediately afterwards. We are to have a paper in this section on "The Hygiene of Camps," but I doubt if it is possible to find any better hygienic rules than those laid down by Moses, who enacted that each man should carry with him a kind of trowel and cover up his excrement immediately.

When we compare the sanitary condition of our towns with what it used to be in the Middle Ages we are proud, and congratulate ourselves upon the perfection of our sewage system, which we are apt to regard as quite a new thing. But about a year ago, during a holiday, I was amusing myself by reading the works of Herodotus, who wrote about four and a half centuries before the Christian era. It so happened that I came across a passage in which he speaks of Minos the Cnossian, who, at the time of Herodotus, was a prehistoric or fabulous individual. By a curious coincidence, at the very moment I was reading this passage in Herodotus,[2] I had, lying on the table, within a few feet of me, a book, "The Palaces of Crete and their Builders,"[3] which the author, my old friend Professor Angelo Mosso, had recently sent to me. In this book is reproduced a photograph of the actual throne of that very Minos who was to Herodotus a mythical

[1] Ecclesiastes, i. 9-10.

[2] Herodotus, iii. 122.

[3] Published by T. Fisher Unwin, London, 1907.

personage. In this book he describes the earthenware pipes by which a water supply was brought to the palace, and Professor Arthur Evans, who has devoted so much time, labour, and money to his researches at Cnossus, has shown that the sewage system of these prehistoric times could hardly be improved upon by the latest expert of the present day.

The towns of Europe in the Middle Ages were very far indeed from being such models of sanitation as the prehistoric Palace of Minos, but even in them we find that preventive medicine was not altogether ignored. Every now and again we hear of wonderful frescoes being discovered in old churches. The usual cry one hears is, "What vandals these people were to cover the fine frescoes with whitewash!" For a long time I could not understand why this had been done, but about thirty-five years ago I went to Avignon, and found that some of the large halls in the Palace of the Popes had just undergone this process. The reason for it was that cholera had broken out amongst the soldiers quartered in the Old Palace, and quicklime had been washed over the walls to destroy any possible infection adhering to them. Any one who reads the vivid description given by Shorthouse in his book, "John Inglesant," of the use of churches as hospitals during an epidemic of plague, will easily understand why people did not dare to spare any fresco, however fine, but unhesitatingly washed it over with quicklime to destroy any possible infection, just as we see the cattle pens at railway stations washed over in the present day. One naturally wonders why such excellent methods as those of the Cretans have fallen into disuse. I may be wrong, but it seems to me that it is because they depended upon what we are accustomed to call "rule of thumb," and not upon scientific knowledge. Another example of the same sort in therapeutics is that the life of the Emperor Augustus was saved by his physician Musa, who put him in a cold bath; but Musa killed the Emperor's nephew by applying the same treatment. Now that we know the use of the cold bath in reducing the temperature in fever, and are able to regulate it by the thermometer, the treatment can be employed with safety, and will almost certainly remain permanent instead of falling into disuse, as it naturally would do after such an unfortunate experience as the one I have just mentioned, where the operator could neither understand the cause of his failure nor foresee how to avoid misfortune in the future. It is when we know the why and the wherefore of any method that it is likely to become permanent.

It is the application of the clinical thermometer devised by Galileo, introduced by Liebermeister and Wunderlich, and rendered popular by Clifford Allbutt, which has given us a precise knowledge of the clinical phenomena of fever, and has enabled us to treat it with more success by antipyretic measures.

But we are not so much concerned here with treatment as with prevention, and our studies are to be directed more especially to causation of fever. In doing this we must always remember there are two sides to such a phenomenon—viz., (1) the exciting agent, and (2) the organism upon which its acts. On this account the phenomena produced by the same agent may vary in two different individuals, or in the same individual at different times, so that the same infection may at one time produce a rise of temperature and at another an actual fall. In the vast majority of instances, however, a febrile condition is indicated by a rise of temperature with quickened pulse and increased tissue metabolism. Such a condition may be produced by chemical substances such as sulphuretted hydrogen, strychnine or β-tetrahydronaphthalin.[1] It may be caused also by normal digestive ferments injected directly into the blood, but it is most usually caused by ferments or toxins produced by microbes. Panum obtained from putrefying solutions a chemical substance which would produce fever. The same was done by Bergmann and Schmiedeberg, who separated a substance they called sepsin which had a similar action. Hermann also obtained bodies like that isolated by Panum, and concluded that they were of a proteid nature and acted like a ferment. Macfadyen and I showed that bacteria had not only the power of excreting ferments which would act upon the media upon which they were growing, but they had the power of adapting these ferments to dissolve the media in the same way as Pavloff has shown that the pancreas of a dog adapts the ferments which it secretes to the nature of the animal's food.

The work of Pasteur, Koch, and many others too numerous to mention, led to the general recognition of microbes as the cause of most diseases, and pathologists studied with eagerness the differentiation of various species of microbes by means of the microscope. But in proportion to our recognition of the fact that it is through ferments and toxines that microbes exert their injurious power the direction of research is changing, and chemical examination is taking a larger place in pathological inquiry. We now know that even when the actual microbes have been destroyed by heat the solutions containing them will produce toxic symptoms on injection into an animal or man. But if the quantity is too small to produce serious symptoms it causes a reaction, and antibodies are formed which not only counteract any effect produced by the original injection, but enable the organism to resist and destroy the living microbes which may afterwards gain entrance. This power of producing immunity is now becoming of very great practical service, and when the dose is regulated by observation of the blood by Wright's opsonic method so that the power of the phagocytes may be increased and not diminished, there appears to be no risk from its use. One finds to a certain extent the same anti-power *in vitro* in relation to ferments, for pepsin and pancreatin in a solution tend to destroy one another. The active digestive ferments in the intestinal canal are rendered inactive during their absorption through the intestinal walls, and I think it is quite possible that the hypothesis which I first formulated in 1889, and repeated in the address I gave at the International Congress in Moscow in 1897, may be correct. It is that "immunity, natural or acquired, is nothing more than an extension to the cells of the tissues generally of the power which is constantly exercised during digestion by those of the intestine and liver."[1]

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[1] O. Weber and Hale White, quoted by Adami, "Principles of Pathology," vol. i, p. 447. Philadelphia and New York: Lea and Febiger, 1908.

By conferring immunity upon man, we may, to a certain extent, prevent disease, as is shown in the most marked way by vaccination for smallpox and, to a less extent, by inoculation for typhoid. But the more we know about the causes of fevers, the more power we have to prevent them altogether. Thus Koch's discovery of the tubercle bacillus has enabled us to combat with considerable success the white plague, tuberculosis, that fell disease which seems to carry off as its victims the most beautiful, the most intellectual, and the most saintly and lovable of a household, and very few households there are to whom it has not brought grief either for its own members or their friends. We have the knowledge, which only needs to be properly, energetically and constantly applied, and in twenty-five years consumption will be as rare in this country as leprosy is now. Laveran's observations upon the nature of malaria, and Manson's and Ross's discoveries regarding its transmission by mosquitoes, have enormously lessened the prevalence of this dire disease, and have rendered habitable whole districts where formerly it was almost impossible to live. In the same way yellow fever has in some places been practically abolished.

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[1] "Comptes-rendus du XII Congrès International de Médecine." Moscou, Août, 1897, p. 174. Reprinted in "Disorders of Assimilation," p. 5. London: Macmillan and Co.

Another disease which is characterized by very severe nervous symptoms, as well as by the skin eruptions from which its name of pellagra is derived, is one of the scourges of Southern Europe, although it appears to be present to a certain extent in every quarter of the globe. It has hitherto been attributed to the consumption of diseased maize, and has been regarded as belonging to the same class of diseases as ergotism. Recent researches of Dr. Sambon, however, render it probable that it is due to a protozoon inoculated into man by a biting fly. Should this theory prove correct, this dreadful disease, which has existed from prehistoric times till now, may be ere long abolished, like yellow fever. But as one disease disappears another seems to come forward.

When I was a house physician in the Infirmary in Edinburgh in 1866, we had sometimes as many as 120 cases of typhus fever in the hospital at one time, and one physician and two house physicians died of it in that year, while two other house physicians barely escaped with their lives. Now typhus is almost extinct and many medical men have not seen a case. But typhoid seems to have increased enormously, whether from increased drainage and water supply causing more ready distribution of the germs or not, I cannot say.

Appendicitis was now much more frequent than it was twenty years ago, and I venture to put forward the hypothesis that its increase has coincided with an alteration in the method of grinding corn. Formerly wheat was ground between millstones, but now it is ground between grooved steel rollers, which like endless scissors cut it into shreds instead of rough particles like the millstones. This is only a hypothesis, but I venture to bring it forward in the hope that it may lead to investigation which may discover the true cause of the disease.

Sleeping sickness, which fifteen or twenty years ago was an endemic disease affecting natives only, in a comparatively small part of Africa, has now become, through increased facilities of communication, a scourge which has not only devastated large districts, but threatens to spread along the whole course of the Nile and even into Europe. As Sir David Bruce has said, "the *Pax Britannica*, by increasing communication, has been more fatal to the natives than all their inter-tribal wars."

Dr. Hope showed me yesterday a report to the effect that it has been found that patients suffering from beri-beri had been largely fed upon polished rice. When the polished rice was discontinued and ordinary rice substituted, they all got well. A number of chickens had also been experimented upon by the same observers, and when the polished rice was given to them the beri-beri occurred, when it was discontinued the beri-beri ceased. When the polishings were given along with polished rice the disease either did not appear, or was cured, if already present.

In order to abolish infective diseases it is necessary to ascertain not only the nature of the microbes which cause them, but the means by which they are carried from one living being to another. For it is not only sleeping sickness with which we are concerned. We find now that the plague which was the terror of the Middle Ages, and which still destroys thousands of lives yearly, is conveyed by fleas. Other diseases are conveyed by ticks. It is curious to find how modern research explains the ideas of savage nations. Thus, in Old Calabar, the house where a person has died is allowed to decay for two years and no person will live in it for fear of being attacked by the spirit of the defunct.[1] After two years, however, it is rebuilt, as the spirit is supposed to have departed by that time. In Madagascar amongst the Sakalava when a death occurs in a village, the settlement is broken up and the tribe removes to a distance, believing that the spirit of the dead will haunt the spot and do harm to those who remain. These beliefs are probably founded on some observations, and the most probable explanation of them is that what the natives believe to be malignant spirits are simply the insects which would convey infection from the dead to the living.

Two questions that have to be answered in regard to many diseases are : (1) How long the infected microbes may remain in the body of the insect and thus render it dangerous ; and (2) whether there are intermediate hosts who may harbour the infection. For example, man has hitherto been considered the sole reservoir of the microbe of sleeping sickness, yet in a recent paper at the Royal Society Sir David Bruce has shown that two and a half years after the removal of all the natives from the tsetse-fly area some of the flies on the lake shore were still infected, so that the infection must either have lasted in them for all this time, or else cattle or other animals must have acted as a reservoir for the infection.

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[1] Thistleton-Dyer's "Folklore."

The greatest of all problems at present, therefore, are (*a*) the identification of all insects which may convey infection, (*b*) a knowledge of their habits, (*c*) of their distribution, and (*d*) of their food, and (*e*) of the animals which prey upon them. Five years ago the University of London established a Chair for Protozoology and the Liverpool University has founded one of Entomology, Three years ago a most valuable report was presented by its occupant to the Corporation of Liverpool on the house fly, the mischief it does and the best means of preventing this. In a lecture which I gave at the London School of Tropical Medicine three years ago, on "Fleas as a Source of National Danger," I said: "There really ought to be established by Government a Chair or, still better, an Institute, of Scientific Entomology, well endowed and having attached to it a number of men who could carry on original investigation. Such a Chair or Institute, if thoroughly well endowed and having money lavishly expended upon it, would repay the expenditure a thousand-fold, for the study of tropical diseases is becoming to a great extent identified with the study of the insects which transmit them." This suggestion has received the approval of the Colonial Office. The Earl of Crewe, Colonial Secretary, says "that there is no present prospect of subsidizing entomological investigation on the liberal scale advocated by Sir Lauder Brunton; and he has been at some pains, therefore, to ascertain whether the object in view could not in a large measure be obtained by a moderate annual outlay." The outcome of this inquiry of Lord Crewe's is that the questions of which I have spoken are now being considered by the Government, and the Colonial Office has formed a committee for Entomological Research. It has sent out entomologists to East and West Africa, and is making arrangements for co-operation between entomologists in all Protectorates with the British Museum, with the London and Liverpool Schools of Tropical Medicine, and with other institutions in the country. Such co-operation will be of the utmost value, and we hope that thereby many diseases may be practically abolished.

Such a Congress as the one that we are holding here will, I have little doubt, be of immense practical service in considering questions of preventive medicine and vital statistics, of suggesting questions to be solved and methods to be employed, and of bringing together men interested in the subject, so that the co-operation which is so vital in all researches of the kind may be most thoroughly established.

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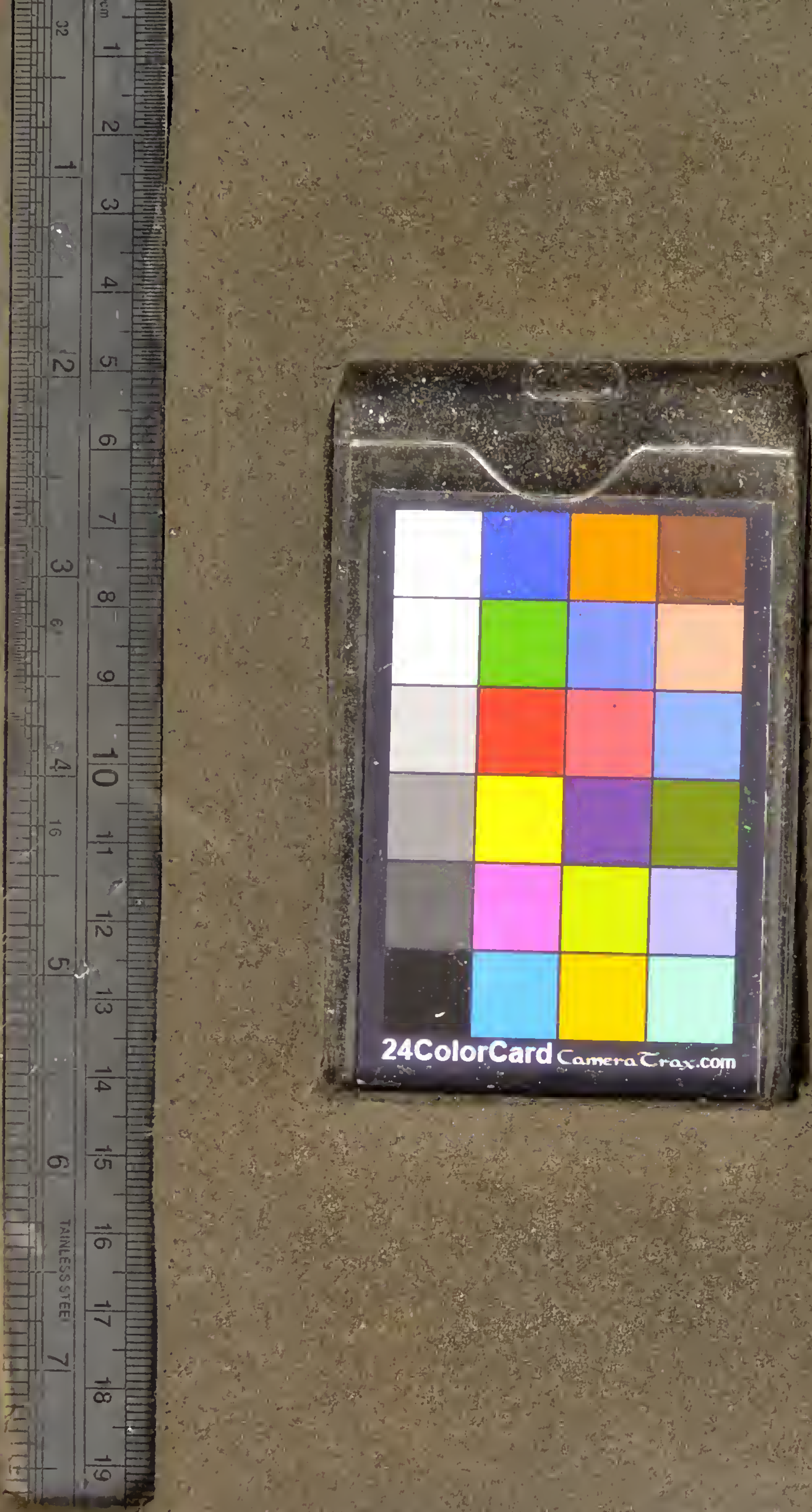
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